DOCUMENT RESUME

ED 457 696 FL 026 932

AUTHOR	McLaughlin, Barry; August, Diane; Snow, Catherine
TITLE	Vocabulary Knowledge and Reading Comprehension in English Language Learners. Final Performance Report.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	2000-05-00
NOTE	46p.; Appendices are not available from ERIC.
CONTRACT	R306F60077-97
PUB TYPE	Reports - Research (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Case Studies; Charts; Critical Thinking; *English (Second Language); Grade 4; Grade 5; *Inferences; Intermediate Grades; Language Skills; *Learning Strategies; Limited English Speaking; Longitudinal Studies; Pretests Posttests; Reading Comprehension; Second Language Instruction; Second Language Learning; *Teaching Methods; *Vocabulary Development
IDENTIFIERS	California; Massachusetts; Virginia

ABSTRACT

This project involves the collaboration of researchers with 24 teachers in a study aimed at investigating and improving the vocabulary knowledge and reading comprehension of 4th and 5th grade students for whom English is a second language. Cross sectional and longitudinal data were collected on various aspects of vocabulary knowledge, vocabulary inferencing, and reading comprehension of English language learners (ELLs) and English-only peers. Researchers and teachers collaborated in developing and implementing intervention strategies directed at improving vocabulary knowledge and reading comprehension in the ELLs. In the first year of the study, the vocabulary knowledge of ELLs and English-only students were examined. In the second year of the study, the intervention (exercises aimed at improving vocabulary knowledge) was implemented at sites in Virginia, Massachusetts, and California. In the third year of the program the intervention was again administered to the same children, now fifth graders and to some other fifth graders who had not been in the study the previous year. Case study analysis of individual students indicated that students who were in the intervention were more likely to employ strategies they were taught to infer meanings than were the control students. It is concluded that the intervention was successful in improving vocabulary development. (Contains 26 references.) (KFT)

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ED 457 696

Final Performance Report

Vocabulary Knowledge and Reading Comprehension in English Language Learners

(Award Number R306F60077-97)

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Submitted to the Executive Officer
Office of Educational Research and Improvement
U.S. Department of Education

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May 2000

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The authors wish to thank Maria Carlo, Terri Lively, David Lippman, Cheryl Dressler, Claire White, Justin Coleman, the many teachers at our three sites, and the students at the University of California, Santa Cruz and Harvard, who participated in this project.

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Executive Summary

This project involves the collaboration of researchers with 24 teachers in a study aimed at investigating and improving the vocabulary knowledge and reading comprehension of fourth- and fifth-grade students for whom English is a second language (English-language learners). Cross-sectional and longitudinal data were collected on various aspects of vocabulary knowledge, vocabulary inferencing, and reading comprehension of English-language learners and English-only peers. Researchers and teachers collaborated in developing and implementing intervention strategies directed at improving vocabulary knowledge and reading comprehension in English-language learners.

There has been relatively little research on the vocabulary development of English-language learners. This study is significant because it is the first to involve

- Systematic research on vocabulary knowledge in English-language learners;
- Longitudinal comparison of native English speakers and English-language learners on
    - vocabulary development over a two-year period
    - inferencing strategies in vocabulary acquisition
    - inferencing strategies in reading comprehension;
- Development and evaluation of intervention strategies designed with 24 participating teachers aimed at fostering vocabulary knowledge and reading comprehension in native English-speaking and English-language learners.

In the first year of the study we examined the vocabulary knowledge of English-language learners and English-only students at the fourth- and fifth-grade levels. The findings indicated a large gap between the groups across all aspects of vocabulary knowledge. We then developed, with the help of participating teachers, an intervention we hoped would increase vocabulary knowledge and sensitivity in English-language learners.

In the second year of the study we implemented the intervention at sites in California, Virginia, and Massachusetts. The intervention involved from one hour a week to two hours (depending on the time teachers allotted) of exercises designed to improve various aspects of vocabulary knowledge. After a year's implementation with fourth graders, we found that there was improvement in breadth of vocabulary knowledge, especially among English-language learners. However, there were no noticeable gains in other aspects of vocabulary knowledge or in reading comprehension in the students in the intervention as compared to comparable students in the same school. Students and teachers expressed a good deal of satisfaction with the program.

In the third year of the study we administered the intervention to some fifth -grade students who had received it in the fourth grade and to a new group of fifth graders. At the end of the year we found that students in the program outperformed comparable students on measures of breadth and depth of vocabulary knowledge and on measures of reading comprehension. For students who were in the program for two years, the additional year had a significant impact on vocabulary knowledge but did not produce a statistically significant effect on reading comprehension. English-language learners in the program closed the gap between themselves and native speakers by about 50 percent, from about one standard deviation on measures of vocabulary knowledge and reading comprehension to .5 standard deviations. Case study analyses of individual students indicated that students who were in the intervention were more likely to employ the strategies they were taught to infer word meanings than were control students. Furthermore, they were more successful in inferring the meaning of unknown words than were control students.

We conclude that a successful intervention program can be developed to improve students' vocabulary knowledge and inferencing skills. The program we developed required approximately 20 minutes a day. Over a two year period, we were able to measure appreciable gains in breadth and depth of vocabulary knowledge and on measures of reading comprehension in English-language learners as well as in English-only students. A more intensive program over a longer period of time would presumably result in even greater gains. Because vocabulary knowledge is so important to reading comprehension and ultimate school success--especially in English-language learners, we hope that educators will use methods similar to ours in more intensive and longer lasting programs. We have developed such a program this past summer and it is currently under review with a major educational publisher.

Overview of Project

Despite excellent programs and devoted teachers, many students for whom English is a second language (English-language learners) have difficulty succeeding in American schools. The ability to read at age- and grade-appropriate levels is particularly critical to school success. Little systematic research has been conducted on reading comprehension in English-language learners. Even less exists on the best predictor of reading comprehension--vocabulary knowledge. This project is intended to address this deficiency in research on English-language learners.

Context

American education is at a crossroads in some ways similar to that faced in the early part of this century. Then, as now, schools in some areas of the country encountered large numbers of students from immigrant families who were not fluent in English. Although in the past some of those students succeeded academically, even graduating from college, most left school without a high school diploma, and many never learned to speak, read, or write English well. Nevertheless, many were able to pursue a decent livelihood, even without adequate English skills.

The situation for non-English speakers is significantly different today. As the U.S. economy has shifted from an industrial base to one requiring workers to possess technological and analytical skills, schools are being asked to prepare all students to read and write at a sophisticated level, to think critically and to apply their knowledge to solving real-world problems. A much higher level of English fluency and literacy is now essential.

English-language learners constitute a particularly high risk group. A recent Congressionally-mandated study indicates that these students receive lower grades, are judged by their teachers to have lower academic abilities, and score below their classmates on standardized tests of reading and mathematics (Moss & Puma, 1995). These findings underscore the importance of research on second-language learning. The dimensions of the problem are enormous in this country where it is estimated that 4.5 million children come to school from families where the home language is other than English. Such children often do not possess the English language skills sufficient to allow them to participate fully in the all-English core curriculum classes. The thesis of this proposal is that many English-language learners do poorly because *they are not reading at the level necessary for school success.*

Research Background

The research literature suggests that--contrary to conventional wisdom--second-language learning is not easy and automatic for children (McLaughlin, 1993). Acquiring a second language requires a great deal of trial-and-error, creative hypot-

hesis-testing, and awkward experimentation. Especially in the classroom context, second-language learning is a difficult and frustrating enterprise for many children. Learning to read in a second language is especially important. For many English-language learners, reading is the beginning of school failure. The late elementary grades are especially critical. At this point children have to learn to read in units larger than individual words(Gibson & Levin, 1975). This at the time that many children who have been in bilingual programs are exited to the all-English classroom.

Especially important in this process is vocabulary knowledge. Studies have shown that a strong relationship exists between knowledge of word meaning and ability to comprehend passages containing those words (Anderson & Nagy, 1992). Vocabulary knowledge is very highly correlated with scores on general intelligence scores, standardized achievement tests, and school success (Dickinson, 1984). Furthermore, some measure of vocabulary difficulty is always a major component of readability formulas used to grade the difficulty of textbooks. The more difficult the words of a passage are, the more difficulty the reader will have in making sense of the text.

There is some research with English-language learners that suggests that vocabulary knowledge is a crucial factor for school success. A study of Latino and Cantonese grade-school children (Ammon, 1987) indicated that unknown vocabulary on tests was a critical linguistic factor adversely affecting reading test performance. In another study, oral vocabulary production was a very strong correlate--and the only oral proficiency correlate--of English reading achievement (Saville-Troike, 1984). Indeed, vocabulary knowledge has been found to be even more important for test performance among fifth-and sixth-grade Latino students than was prior knowledge of content (Garcia, 1991).

Goals of the Project

Our project aimed at assessing the development of vocabulary knowledge of fourth- and fifth-grade students who are learning English as a second language and at comparing their development with that of native English-speaking peers. Over a three-year period we tested the breadth and depth of children's vocabulary knowledge and their strategies of inferring vocabulary meaning and meaning from text. We also observed how classroom discourse and the strategies teachers and learners employ supports vocabulary learning and reading comprehension.

In addition, we developed--with the teachers involved in this project--intervention strategies to increase both the breadth and depth of vocabulary knowledge and reading comprehension. The intervention program was developed in a series of meetings with teachers, drawing on their experience with English-language learners and on what is known in the literature on the effects of vocabulary instruction on reading.

Research Questions

Six research questions guided our research:

1. ***How many words do English-language learners know and how does the breadth of their vocabulary knowledge compare to that of native English speakers?***
2. ***How well do English-language learners know the words in their lexicon and how does depth of vocabulary knowledge of English-language learners compare to that of native English speakers?***
3. ***What effect does first-language vocabulary knowledge have on second-language vocabulary development?***
4. ***Do English-language learners use the same strategies to infer vocabulary meaning as do native English speakers?***
5. ***Do English-language learners use the same strategies in reading comprehension as native English speakers?***
6. ***Can effective intervention strategies be devised to improve vocabulary knowledge and reading comprehension in English-language learners?***

In one of the few studies addressing the question of the vocabulary development of bilingual children, the Dutch researchers Verhoeven and Vermeer (1989) found that children from immigrant families who did not speak Dutch in the home lagged behind native Dutch classmates in language ability, with the most prominent delay at the vocabulary level. Four-year-old immigrant children had limited vocabulary knowledge in Dutch. Furthermore, vocabulary differences between native Dutch and immigrant children increased as the children grew older.

There have been no studies of the vocabulary growth of English-language learners in the United States. Our first goal ***(corresponding to the first question in the previous section)*** was to address this serious gap in the literature by examining vocabulary knowledge in English-language learners and comparing their knowledge with that of their monolingual peers. Moreover, in a longitudinal design, we looked at vocabulary development in both groups of children over a two-year period. Included in the longitudinal study was a case study of a sub-sample of English-language learners who were studied in more detail. One purpose of the case study was to determine the interaction between levels of English proficiency and vocabulary growth. We looked at various factors that influence vocabulary development, such as student attitudes toward the intervention strategies and classroom interaction patterns.

Traditionally, researchers have been concerned solely with the number of words in the child's lexicon--i.e., the ***breadth*** of vocabulary knowledge. It is important as well to look at the ***depth*** of the child's knowledge--i.e., how well does the child know the words in the

lexicon. The second goal of this study ***(corresponding to the second question in the previous section)*** is to examine the child's understanding of the multiple meanings of words. Many words in English have multiple meanings, and even words with an apparently unambiguous meaning express different aspects of meaning. Barclay, Bransford, Franks, McCarrell, & Nitsch (1974) gave the example of the word 'piano':

The man lifted the piano.
The man tuned the piano.
The man smashed the piano.
The man sat on the piano.
The man photographed the piano.

In these different contexts, various meaning aspects of the word 'piano' are emphasized: 'is heavy,' 'musical,' 'made largely of wood,' 'has a flat surface perpendicular to gravitational pull,' and 'has a characteristic shape.'

In one of the few studies of vocabulary depth, Verhallen and Schoonen (1993) showed that the vocabulary delay of bilingual children was not confined to the number of words in the target language. Children from immigrant families lagged behind native speaking peers in both *number* and *range* of meaning aspects. We use methods similar to those used in that study to explore English-language learners' understandings of the conceptual properties of vocabulary items, and compare them to those of native speakers. We also examined in a longitudinal study how the vocabulary system develops over two years in English-language learners and native English speakers.

The next objective ***(corresponding to question three above)*** was to determine the effect of first-language vocabulary knowledge on second-language vocabulary development. To address the question of transfer from the first language, we examined breadth and depth of vocabulary knowledge in both languages of English-language learners. We looked at the effect of such mismappings on reading comprehension in English.

The next objective ***(corresponding to the fourth question in the previous section)*** was to examine the strategies that English-language learners use to infer meanings of new words. As Sternberg (1987) has pointed out, most vocabulary is learned from contextual information modified by such variables as density of unknown words in the text, importance of the unknown word to understanding the meaning of the text, variability of contexts in which the unknown word appears, and the like. We used a variety of techniques to look at the ways in which English-language learners and native speakers inferred the meaning of unknown vocabulary items.

The next objective ***(corresponding to question five above)*** was to examine reading comprehension strategies in English-language learners and native English speakers. In particular, we were interested in comprehension inferencing strategies. An important recent discussion of inferencing strategies, Graesser, Singer, and Trabasso

(1994)argued that readers attempt to construct a meaning representation that addresses their goals, that is coherent at both local and global levels, and accounts for why actions, events, and persons are mentioned in the text. We compared inferencing strategies in our participants and relate their effectiveness to vocabulary knowledge and reading comprehension scores.

The next issue ***(question six)*** is whether an effective intervention program can be developed to build vocabulary of English-language learners. The specific form of the intervention program was co-constructed with the teachers involved in our research and was based in part on classroom observations made during the first year. A study of the effectiveness of the approach as conducted in the next two years.

There were several considerations that guided us in developing the intervention program.

- First, many of the traditional approaches to vocabulary enrichment (e.g., looking up words and writing sentences using those words) have not been effective (Stahl & Fairbanks, 1986). Effective methods involve interactions between teachers and students with texts, where there is teacher-assisted engagement with words (Anderson & Nagy, 1992).
- Discourse styles must be taken into account when working with children from culturally and linguistically diverse backgrounds.
- It is important that vocabulary enrichment go on throughout the school day.
- In the bilingual context children should be helped to realize that words have many meanings and that these are not necessarily equivalent for the translation across languages.
- The research that we conducted on the students' breadth and depth of vocabulary and on strategies of vocabulary inferencing helped us in designing the intervention program.
- Finally, the knowledge and experience of the teachers working with us was a source of insight into effective techniques.

Research Design

The project was carried out over a three year period. During the first year conducted a cross-sectional study of 24 fourth- and fifth-grade classes at three sites--Santa Cruz, CA, Fairfax, VA and Boston, MA. To allow for comparison across sites, all English-language learners were Spanish-speaking and the number of English-only students and English-language learners was approximately even. The intervention strategies was developed in the first year with the help of the teachers working with us on the project. During the next two years, we conducted a longitudinal study, following two cohorts of students (both English-only students and English-language learners). One group of students received the intervention program and the other did not. Our goal was

to see how vocabulary knowledge develops over a two-year period and to determine what effect the intervention program has.

Thus the first year consisted of a data-gathering cross-sectional study and the development and piloting of the intervention strategies. The next two years involved a longitudinal study. We studied fourth- and fifth-grade classes as follows:

Component	Time	Sites	Classes/Site	Total No. Classes
Cross-Sectional	Year One	CA., MA., VA.	4 fourth grade 4 fifth grade	24
Longitudinal	Year Two	CA., MA., VA.	4 fourth grade	12
Longitudinal	Year Three	CA., MA., VA.	4 fifth grade	12

The cross-sectional study in the first year gave us new information about breadth and depth of vocabulary and vocabulary inferencing and comprehension inferencing skills of English-language learners and monolingual peers. The longitudinal study replicated the first year, and gave us information about the development of vocabulary knowledge, and vocabulary inferencing and comprehension inferencing strategies in English-language learners and monolingual peers over an important two-year period. In addition, the longitudinal study enabled us to assess the effectiveness of the intervention strategies.

In each year we gave all students a battery of tests as well as tests of the breadth and depth of vocabulary knowledge. The vocabulary tests were repeated early in the fall and in the spring. During the year we looked at vocabulary inferencing strategies and reading comprehension strategies. As part of the longitudinal study, in the final year we conducted a case study of a selected sub-sample of English-language learners at each site, who were studied in greater depth. The following table summarizes the data gathering process. The test materials can be found in **Appendix A**. In addition, during the intervention phase of the study, we interviewed teachers and students for their reactions to the intervention.

Year One Tests administered to fourth- and fifth-grade English-language learners and native English speakers		
Fall	**Winter**	**Spring**
Peabody Picture Vocabulary Polysemy Comprehension Real/Pseudo Word Decoding Word Depth Interview Naming Task Polysemy Production	Raven CPM Word Interpretation Paragraph Interpretation Word Identification Reading Comprehension Listening Comprehension	Peabody Picture Vocabulary Polysemy Comprehension Real/Pseudo Word Decoding Word Depth Interview Naming Task Polysemy Production
Year Two Tests administered to fourth-graders, half of whom receive the intervention program		
Fall	**Winter**	**Spring**
Peabody Picture Vocabulary Polysemy Comprehension Polysemy Production CLOZE Test Real/Pseudo Word Decoding Word Depth Interview Curriculum Dependent Tasks	Raven CPM Word Interpretation Paragraph Interpretation Spanish Peabody	Peabody Picture Vocabulary Polysemy Comprehension Polysemy Production CLOZE Test Curriculum Dependent Tasks
Year Three Tests administered to fifth-graders, half of whom receive the intervention program		
Fall	**Winter**	**Spring**
Peabody Picture Vocabulary Polysemy Production CLOZE Test Line Depth Test Morphology/Spelling Task Curriculum Dependent Tasks	Raven CPM Real/Pseudo Word Decoding	Peabody Picture Vocabulary Polysemy Production CLOZE Test Line Depth Test Morphology/Spelling Task Curriculum Dependent Tasks
Case study of a selected sub-sample of English-language learners		

Findings for Year One

In the first year we addressed primarily the first three research questions.

1. *How many words do English-language learners know and how does the breadth of their vocabulary knowledge compare to that of native English speakers?*

To answer this question we administered the Peabody Picture Vocabulary Test (PPVT) in English to all students in our sample and in Spanish to students who knew that language. Table 1 gives the results across all sites for Fall and Spring administrations. It is clear that there is a large vocabulary gap between native and non-native speakers at each site and across all sites. Moreover, the gap remains over the course of the year. The main goal of our intervention will be to diminish the difference between these two groups by the end of the study.

Table 1
Differences between English-Language Learners and Native Speaker in Breadth of Vocabulary as Measured by the PPVT

Group	Mean	S.D.	N
Fall Testing			
English Language Learners	87.36	21.23	109
Native Speakers	116.87	13.73	208
Spring Testing			
English Language Learners	87.24	23.26	63
Native Speakers	122.60	13.21	84

We also collected data from another task, a Naming Task, in which participants were to name as many objects as they could in a kitchen and classroom scene. That test also revealed a large and statistically significant gap between the native and non-native English speakers.

2. *How well do English-language learners know the words in their lexicon and how does depth of vocabulary knowledge of English-language learners compare to that of native English speakers?*

We had two measures of depth of vocabulary knowledge. In the first of these tasks, students were asked to write as many meanings as they could think of for the words, "bug," "ring," "light," and "hand." Their responses were coded with more weight given to meanings that were more removed from the core meaning. For example, "a bug in a computer program" is a relatively remote use of the word "bug," whereas "an insect" is the core meaning. When the responses of English-language learners and native speakers at the Santa Cruz site were compared on this measure we obtained the results shown in Table 2. Again, there was a large and significant gap between native and non-native speakers.

Table 2 Differences between English-Language Learners and Native Speaker in Depth of Vocabulary (Production of Multiple Meanings)			
Group	Mean	S.D.	N
English Language Learners	5.04	3.74	49
Native Speakers	10.30	4.08	132

Finally, we had a sentence judgment task, in which students were to decide whether sentences such as the following made sense:

"We were growing sheep last year"
"Their love for each other grew"
"The boy grew two inches."
"My teacher wants the homework to grow up"

These sentences contained a number of words with multiple meanings (such as "grow") and the student's task was to say whether the usage made sense in English. Again, the English-language learners were significantly poorer in their performance than native speakers.

When we combined the various measures of breadth and depth of vocabulary knowledge for English-language learners and English-only students, we found that the gap between the two groups was the same for both aspects of vocabulary knowledge. That is, converting the scores on various measures to standard scores and combining (Table 3) showed similar gaps at both fourth- and fifth-grade levels. If anything, the gap was becoming greater.

Table 3 Relative Performance[1] of English-Language Learners and Native Speaker on Fall Assessments of Vocabulary Breadth and Vocabulary Depth					
Group		Breadth	N	Depth	N
Fourth Grade	ELLs	28.33	47	27.79	17
	EOs	56.25	91	54.16	55
Fifth Grade	ELLs	40.86	56	38.46	27
	EOs	61.62	108	58.81	74

[1] Measured on a T scale with a mean of 50 and standard deviation of 10.

3. *What effect does first-language vocabulary knowledge have on second-language vocabulary development?*

We administered the Spanish version of the Peabody Picture Vocabulary Test to all children who spoke Spanish. This included a number of children who were not from Spanish-speaking homes, but who were enrolled in a Two-Way Bilingual program. The native speakers did better than the non-native speakers, but the latter group did remarkably well (see Table 4).

The correlation between the English and the Spanish versions of the Peabody for native Spanish speakers was -.27. This correlation most likely reflects the fact that some of the Spanish speakers are more advanced in English and others are relative newcomers. The correlation between the English and the Spanish versions of the Peabody for non-native speaker was .29, suggesting that better students do better at both.

Table 4
Differences between Native Speaker and Non-Native Speakers on the Spanish Version of the PPVT

Group	Mean	S.D.	N
Native Speakers	76.12	10.99	33
Non-Native Speakers	64.62	20.58	16

However, our research question concerns the effect of first language vocabulary on *vocabulary development*. When we ran a correlation between the individual gain scores on the Peabody and on the Naming task across the year and the Fall and Spring Spanish Peabody scores, all correlations were close to zero. Hence there does not seem to be a relationship between first language ability and vocabulary development in English for non-native speakers. This may be because some students loose their Spanish as they acquire English and other students retain Spanish.

There was an interesting finding on our reading measure. As can be seen from Table 5, the intercorrelation matrix indicated that vocabulary measures correlated with reading much more for English-language learners than for English-only students. This indicates that at this stage, vocabulary knowledge is more important for English-language learners in achieving success in reading than it is for English-only students (who presumably are using world knowledge and other inferential skills in their reading at this point).

Table 5 Intercorrelaiton Matrix and Multiple Rs for Reading Measures for Year 1				
English-Language Learners (N =109): R^2 = .60				
	Peabody	Naming Task	Polysemy Comprehen.	Polysemy Production
Reading Measure	.48	.46	.30	.43
Peabody		.59	.47	.74
Naming Task			.51	.62
Polysemy Comprehension Task				.43
English-Only Students (N= 208): R^2 = .24				
	Peabody	Naming Task	Polysemy Comprehen.	Polysemy Production
Reading Measure	..46	.13	.17	.31
Peabody		.29	.12	.37
Naming Task			.19	.13
Polysemy Comprehension Task				.11

The findings for this year are consistent with those of others who have reported similar differences between the vocabulary knowledge of English-only children and English-language learners (Serapiglia, 1978; Umbel & Oller, 1994; Umbel & Pearson, 1992). This is not surprising in view of the differences in exposure to the language and in opportunities of use. However, our findings also indicate that the vocabulary gap remains constant over the course of a year. English-language learners are learning more vocabulary, but so are English-only children. For further analyses of the first-year data, see **Appendices B and C**.

Our findings agree with the results of Dutch studies in which the vocabulary knowledge of native and non-native children was compared over time. Verhoeven and Vermeer (1993) found that the gap in receptive vocabulary of native and non-native speakers increased over time when they compared Dutch lower SES children aged 4 to 12 with Surinamese and Antillian children, as representatives of children with colonial backgrounds, and Turkish and Moroccan migrant workers' children. Appel and Vermeer (in press), in their study of the receptive and productive vocabulary of Dutch native and

non-native speakers, also found a persistent vocabulary gap between native and non-native children in the first four grades.

There has been a great deal of debate in the literature about the time it takes for English-language learners to acquire English in a school setting (McLaughlin, 1985). Estimates range from a year to as many as seven years. It is clear from the present study that it is difficult for English-language learners to close the vocabulary gap because English-Only children are learning more vocabulary each year as well. Appel and Vermeer (in press) found that a program of two to four hours of vocabulary instruction within and outside of the classroom helped to close the gap between non-native and native Dutch children in the first four grades. Children in the program were only a year behind native speakers after a year, whereas control non-native speakers were two or three years behind. We hoped that our intervention would foster similar vocabulary development with attendant gains in reading comprehension and school achievement in non-native speakers.

Intervention Program

Conceptual Framework

The intervention program is based on a conceptual framework that sees vocabulary development as involving multiple tasks. In particular, the learner has to acquire knowledge of the concepts the word represents, knowledge of the associations a word evokes, knowledge of the word's connotations, knowledge of the word's collocations, knowledge of the word's social and stylistic constraints, knowledge of the word's derivational possibilities, knowledge of the word's syntactic behavior, and knowledge of the multiple meanings of the word. A full discussion of these aspects of vocabulary knowledge can be found in the Conceptual Framework in **Appendix B**.

More specifically, we see vocabulary development as a lifetime project. All speakers of the English language are constantly expanding and deepening their understanding of words in the English language. In the course of this intervention we focus on a relatively small number of vocabulary items (12 a week, chose as words that children of this age are learning), but the hope is that the strategies that students learn will generalize to their contact with other words. We believe that children need to learn the definitions of words, but also have to learn strategies for inferring meanings. They should be taught roots, affixes, and cognates, but they also need to develop strategies for monitoring their own understanding as they read texts.

We encouraged teachers to incorporate vocabulary learning into all subject matter instruction, so that children see that the strategies they learn --looking up definitions, inferring meaning from context, and monitoring their understand -- apply in all areas of learning. We used a variety of means of developing vocabulary-learning strategies. In Year 2, the text was based on Fables and the weeks were structured as follows:

Day 1: -- We introduced the story in Spanish for English Language Learners and teach them the meanings of words in the text they might not understand as well as the target words.

Day 2: -- Introduce a story and define target vocabulary words. Develop vocabulary inferring strategies.

Day 3: -- Contexting Activities: Show how the words are used in context.

Day 4. – Word Activities: Activities to develop and enhance students' knowledge of word meanings.

Day 5: – Word Activities: More activities to reinforce and deepen vocabulary knowledge.

Activities

There were two six-week segments to the intervention in Year 2. The sixth week of each segments was a review of all the words learned in the previous 4 weeks using new activities. **Appendix C** shows the daily schedule for the intervention in Year 2. The 12 core words targeted each week were words that students at this level are likely to encounter repeatedly across texts in different domains. The text we used was Arnold Lobel's book of classic fables published by Scholastic.

Table 6 lists some of the activities we used in the intervention. The full set of Intervention Materials for Year Two is found in **Appendix D**. Teachers were asked to devote from 15 minutes to a half hour each day for these activities. Our observations and teacher reports indicated considerable variability in the amount of time the teachers spent--in some cases, the minimum to cover the material and in other cases teachers often went beyond a half hour.

Table 6
Some Activities Used to Foster Vocabulary Growth

Charades: Students work in competing teams. They act out words for their team as in the charade game.

Word Substitutions: Students hear a word in a sentence and are asked to think about its meaning and replace it with another word or phrase that means the same thing.

Word Guess: Students work in teams and have to prompt team members to guess a target word by giving one-word clues.

Word Bee: Small groups generate definitions of target words for the whole class, which evaluates their adequacy.

20 Questions: One student chooses an animal from one of the fables and tells the teacher. The other students ask questions to identify the features of the animal until they have enough information to identify the animal.

Word Wizard: Students note uses of target words outside of class (at home, on TV, with friends) and post the words and its context in class.

Word Webs: The teacher writes the target vocabulary word in the center of the word web and asks the students to complete the empty web by providing the definition, synonyms, antonyms, other meanings, and new sentences using the word.

Multiple Meanings: Students are given a target word and are asked to provide as many meanings of the word they can come up with.

Cognates: Students write identify Spanish cognates in the passage and discuss the meaning of the word to insure it is the same in both languages.

Word Associations: The teacher displays the word list and gives either a one-word clue or a phrase related to one of the vocabulary words. Clue words are read one at a time until a student chooses the correct vocabulary word and can justify the answer.

Word Sort: Students are given a set of word cards and are asked to separate them into groups depending on characteristics of the words. They are asked to explain how each group is different and why each word fits into the group.

Idioms: Students are given a list of five idioms and are asked to discuss the meaning of each idiom and then write down a definition on their worksheet. They are also asked to write an additional sentence using the idiom.

Strategies

We attempted to make the teachers aware that they should be teaching strategies that the students could use to apply to all vocabulary learning across all subject matter. These strategies included the following:

- ***Inferring Meaning from Text***

  Each week of this program begins with an exercise in which students are to infer the meaning of specific words from the text for that week. We have deliberately selected words where there are enough cues for students to figure the meaning out.

  However, in many cases this is not true. Context does not give a lot of information about the meaning of new words. In a study by Beck, McKeown, and Omanson (1987), only 3 percent of adults could define *grudgingly* in the following passage:

  (1) Sandra had won a dance contest and the audience's cheers brought her to the stage for an encore. 'Every step she takes is so perfect and graceful,' Ginny said grudgingly, as she watched Sandra dance.

27 percent could define *lumbering* in this passage:

(2) Dan heard the door open and wondered who had arrived. He couldn't make out the voices. Then he recognized the lumbering footsteps on the stairs and knew it was Aunt Grace.

On the other hand, 86 percent could define *commotion* in this passage:

(3) The animals ran past Wendy, tripping her. She cried out and fell to the floor. As the noise and confusion mounted, Mother hollered upstairs, 'What's all that commotion?'

What makes the difference is the number of context clues that help the reader to figure out what the meaning of the word might be. The context is actually misleading in passage (1), but in passage (3) there is enough information from the text to make a good guess as to the meaning. In passage (2) there is very little information.

We encouraged teachers to ask students to tell them whether there are enough context clues in passages such the three given above. We asked the teachers to have the students **think aloud** as they try to figure out the words. Some other examples:

(4) John wanted to know how long dinosaurs slept. He read every book he could find in the school library. He looked in encyclopedias. He asked his teachers. After extensive research, he finally found the answer. (Good context clues)

(5) The man was skilled in wood carving. He had labored many hours and had produced one of his finest bird carvings. 'This is my best work,' he said somewhat lackadaisically. (Not much context)

(6) Maria was somewhat worried. She had not seen her cat for several days. He did not return at night. She asked her mother, but she could not tell her where he was. In her tribulation she prayed her hardest that he would soon return. (Good context)

- ***Using Roots***

Some reading researchers have argued that one of the best ways to expand a child's vocabulary is through 'structural analysis.' By this they mean helping children figure out the parts of words--how they are structured. For example, the word *unfruitful* has the prefix *un-*, the root *fruit*, and the suffix *-ful*. Other words, such as *snowman* are compounds of two words.

The first step in structural analysis to help students learn what is a **meaningful unit** in a word. They need to avoid 'phantom prefixes,' such as *re* in *reality*. They will need help so as not to look for 'little words in big words.' This will lead to such mistakes as finding *moth* in *mother* and *fat* in *father*.

Such problems can be overcome by explicit instructions and modeling. We encouraged teachers to convey clearly to students when and how to apply structural analysis. Students should be given guided practice, with the teacher providing prompts and questions as needed. As students learn how to apply what they have learned, the teacher's prompts can be less frequent.

It is important to rely more on examples than on abstract rules, principles, or definitions. Teachers should teach students the meaning of such concepts as *prefix, suffix, root,* and *compound*. However, they will have to illustrate them with numerous examples. It helps to begin with words that are already familiar to the students.

It is also important to recognize the diversity of English word structure. Some suffixes are relatively easy to teach, such as *-ness* and *-ity*. Others, such as *-tion*, have meanings that are more abstract and are difficult to convey. Structural analysis has its limitations, but if students can be helped to recognize familiar words and parts of words in new words, they can make rapid strides in vocabulary development.

- ***Deep Processing***

One of the most difficult tasks in vocabulary instruction is to have students process new words at a deep level. By this we mean having students make semantic links to other words and concepts and attain a deeper and richer understanding of a word's meaning.

One way to have students make these connections and process words more deeply is to have them answer questions about target words that indicate that they have a clear understanding of their meaning and then to write a sentence that uses the word in a related way. For example, reading researchers Isabel Beck and her associates (1987) gave children these tasks:

1. Which one of these things would an <u>accomplice</u> be likely to do?
    A. Squeal to the police in return for not having to go to jail.
    B. Rob a bank by himself
    C. Enjoy babysitting

Write one more thing here than an <u>accomplice</u> might do: _____

2. Which one of these things would a <u>virtuoso</u> be likely to do?

A. Forget the notes to the music she is playing
B. Play so well that the audience bursts into applause
C. Wear clothes that don't match

Write one more thing here than an virtuoso might do: _____

We asked teachers to do something similar to this in a less structured way, asking students questions about words they are learning that assure that they understand the word's meaning. We also asked them to have students think up new sentences using the words. The more practice they have at such tasks, the deeper the word's meaning will become.

Beck and McKeown also suggested an activity in which students are asked whether a person represented by one of the new words could also be represented by another new word. For example:

Could a virtuoso be an accomplice?
Could an accomplice by a virtuoso?

Answering such questions enrich the understanding of each word by encouraging students to think of communalities and differences among words. These questions require students to explain *why* one thing is similar or different from another. Children enjoy such tasks, which help them become aware of nuances of meaning. Any tasks that enable students to play with words and use them creatively are helpful to vocabulary development.

- ***Rich Instruction***

One of the primary goals of our program is for students to acquire word knowledge that is rich and proficient enough to facilitate reading comprehension. The various instructional activities we propose are targeted to this goal. However, it is important for vocabulary learning to go on throughout the day, in all subjects.

Teachers should arrange instructional conditions so as to provide diverse opportunities for a maximum amount of processing of words. Students should be required to manipulate words in varied and rich ways. For example, new words should be related to other words and to familiar experiences in the lives of the children. Students need to use the new words in ways that foster strong relationships and associations with other words in their vocabularies.

When new words are encountered, we asked teachers to engage in several activities that we thought would be helpful in promoting deeper and richer relationships and associations:

1. *Ask students to provide superordinate and subordinate instances.* For example, "A tyrant is a type of what?" (superordinate category: ruler). "Can you give me examples of tyrants?" (subordinate categories: older brothers, Macbeth)

2. *If the word is a noun, ask the students to provide three adjectives that fit with it.* For example, if the target word is dictator, the students might provide adjectives such as harsh, cruel, or military. These answers show some understanding of the meaning of the term dictator. Other responses such as old or good can be used with most nouns, but do not show much understanding of the meaning of the word dictator.

3. *If the word is a very, ask the students to provide three adverbs or phrases that fit with it.* For example, if the target word is persevere, the students might give answers such as steadily, firmly, or with determination.

4. *Ask the students for synonyms and antonyms of the target word.* "What is another word for tyrant?" "Can you tell me what the opposite of a dictator is?"

Research shows that words are learned best if they are encountered and used frequently by the child. A child might be able to define a miser as someone who saves money and lives as if they were poor, but having a rich understanding involves being able to give examples of miserly behavior, knowing what the consequences are of acting like a miser, and being able to use the word beyond typical contexts, for example, by extending the concept to describe people who are stingy with other things besides money.

A great deal of vocabulary learning goes on in Social Studies and Science and Mathematics. Children will learn the words they need in these subjects if they encounter them repeatedly, in different contexts, and if they use them in their own speech. In this way, words will become part of the child's lexical knowledge and the child will have a network of associations for these words. For example, a child can learn to use the word hypothesis not only in science and mathematics, but also in talking about different theories about a story's meaning.

Rich networks of word relationships and associations are likely to develop if children are exposed to a verbal environment in which unfamiliar vocabulary (not too far in advance of the child's abilities) is used in a reflective and playful manner. Such an environment helps children notice words they do not know and raises their consciousness about word learning.

- ***Promoting Word Play and Creativity with Words***

Children enjoy word play and games with words--witness the popularity of games like Scrabble, Boggle, and Balderdash. There are a number of things teachers can

do to have children explore the meanings of words and use words in creative and imaginative ways, while enriching their understanding.

1. *Have the class use words in original but legitimate ways.* For example, if you are trying to have children learn the meaning of convention for Social Studies, you could ask children to make up "goofy" sentences with that word, such as, "The gulls on the beach were having a convention."

2. *Have the class play with roots and affixes.* For example, have them think of all the roots they can for which allow both -ful and -less:

thankful	thankless
useful	useless
graceful	graceless
thoughtful	thoughtless etc.

Then all the words that allow only -ful:

handful	*handless (?)
playful	*playless (?)
grateful	*grateless (?)
awful	*awless (?) etc.

Then all the words that allow only -less:

senseless	*senseful (?)
baseless	*baseful (?)
speechless	*speechful (?)
formless	*formful (?) etc.

3. *Have children play with idioms, asking them to explain what idioms mean and having them make up 'crazy' idioms of their own.* Some idioms to use might be:

It's raining cats and dogs.
You are pulling my leg.
He kicked the bucket.
She pulled out all the stops.
Not for the life of me.
I'm fresh as a daisy.
Let's see how the wind blows.
She rubbed me the wrong way.
She is trying to feather her own nest.
He got off lightly.
It was a case of dog eat dog.
It goes against the grain.
I was a dead duck
Don't beat about the bush.

A penny for your thoughts.
That's a tough act to follow.
I'll do it by hook or by crook.
He got up on the wrong side of the bed.
She's having a bad hair day.

- ***Sayings and Expressions***

Another way to engage children in language is to make them aware of all the sayings we have in English. Spanish-speaking children could be encouraged to think of similar expressions in their language.

Some English sayings:

It's easy to be brave from a safe distance.
A bad workman blames his tools.
A bird in the hand is worth two in the bush.
Life is what happens to you while you are making plans.
The tree is known by its fruit.
Well begun is half done.
Human blood is all one color.
Birds of a feather flock together.
A squeaky door gets greased.
A friend in need is a friend indeed.
The best things in life are free.
A little knowledge is a dangerous thing.
A rolling stone gathers no moss.
Might makes right.
Don't put off till tomorrow what you can do today.
Talk of the devil and he's bound to appear.
The exception proves the rule.
Tit for tat.
Too many cooks spoil the broth.
A stitch in time saves nine.
Time is a great healer.

We had teachers ask their Spanish-speaking students to bring some similar expressions to class--after talking to parents and other relatives. They had them translate the expressions literally into English and ask the English-only students to guess what they mean. Some examples:

Tener carta blanca
Quemarse las pestañas
Hacer su agosto
No tiene ni pies ni cabeza

Matar dos pájaros de un tiro
Quitarle un peso de encima
No dar el brazo a torcer
Costar un ojo de la cara
Pagar el pato
Meter las narices en todo
Un circulo vicioso
Encontrarse entre la espada y la pared
Qué mosca le ha picado?
Estirar la pata
Romper el hielo
Ser el colmo
Consultarlo con la almohada
Buscar una aguja en un pajar

- ***Understanding Polysemy (Multiple Meanings)***

One of the most interesting things about the English language is that many of the words we use are polysemous. That is, they have multiple meanings. It is estimated that over 70 percent of English words are polysemous.

Many of the most common words have multiple meanings. Consider the following dictionary definitions:

light: a source of illumination
daytime
a means of igniting, as a match
of little weight, not heavy
pale or whitish in color
not burdensome or oppressive, easy
to set on fire

spring: to rise up
to leap
the vernal season
water rising from the earth
an elastic strip of metal

fast: moving at a rapid pace
of a clock, showing too advanced time
loose in morals
not subject to fading, lasting
voluntary abstinence from food

close: to stop up, shut

to finish, conclude
to unite, come together
near to, in contact with
secretive, reticent
miserly

One exercise we proposed was to have students (or groups of students) use a dictionary and present the class with examples of words that have many meanings. Or the teacher could present the class with words such as, "charge," "check," "mean," "play," "suit" and the like and have the students say (or write down) as many meanings as they can think of. Such activities increase awareness of the polysemous nature of the English language. Awareness of the multiple meanings of English words is critical to successful reading. This is especially true for children whose native language is not English.

English-language learners need to recognize that when he or she encounters a word, it may have a different meaning from the one already learned. For instance, the student reading that "The minister decided that he should table the legislation," may not understand what is meant because he or she does not know that "table" has multiple meanings. Even advanced learners and native speakers can be misled because they base their understanding on more frequent meanings of words, whereas a less frequent meaning might be intended.

- ***Using Cognates***

A rich source of information for many English-language learners, especially those whose first language is Spanish, is knowledge of cognates. In one study it was found that sixth- and seventh-grade bilingual students who were proficiency readers in English made effective use of their cognate knowledge, whereas less proficient readers did not.

There appears to be considerable variability in students' ability to recognize and utilize cognate relationships. Research has shown that many upper-elementary bilingual Latino students did not fully utilize their knowledge of cognates in reading (Nagy et al., 1993).

One reason may be that there are also "false friends," words in English that look similar in meaning to Spanish words but which are not. Consider the following categories:

Exact cognates:
idea-idea
animal-animal
general-general
cruel-cruel

terrible-terrible

Cognates with slightly different spellings:

secret-secreto
lottery-loteria
patient-paciente
optimist-optimista
immigrant-imigrante
emotional-emocional
national-nacional
important-importante

Cognates with quite different spellings:

day-dia
flowers-flores
jardin-garden
estatua-statue
estudiante-student
puerto-port
gabinete-cabinet
cementerio-cemetery

False Cognates:

pariente-relative not parent
gracioso- funny not gracious
sensible- sensitive not sensible
fabrica- factory not fabric (accent on the "a")
exito- success not exit (accent on the "e")
sucesos-events (not successes)
colegio-elementary school (not college)
comodidades-comforts (not commodities)
constipado-stuffed up (nose) not constipated
(and the famous) embarazada- pregnant not embarrassed.

It is important to realize that there are many borrowings from English in American Spanish. Words such as "picnic," "jonron," "nocaut," or "taco" in English are borrowings and not cognates. Teachers need to be able to make these distinctions themselves and help students to learn them and use cognates when appropriate.

Findings for Year Two

Data Analyses

The primary question we were concerned with in our research this year was Question 6:

Can effective intervention strategies be devised to improve vocabulary knowledge and reading comprehension in English-language learners?

To answer this question we compared the difference between those students who received the intervention and those in comparable classes in the same schools who did not. The first analysis examined whether the intervention made a difference on the learning of the target core vocabulary items. These we called the "curriculum dependent" items and the analysis is shown in Table 7. The table shows the gain scores from Fall to Spring testing.

Table 7

Gain Scores of Native and Non-Native Speakers in Intervention and Control Groups on Curriculum Dependent Items, Year 2

Group	Intervention	Control
Native Speakers	1.46 (N=63)	.49(N=53)
Non-Native Speakers	1.25(N=41)	.35(N=37)
Total	1.38 (N=104)	.44 (N=90)

Differences between intervention and control participants were statistically reliable, indicating that the students who received the intervention learned the target core words better than the control peers.

In addition, we looked at overall gains in vocabulary knowledge by examining the scores of students in the intervention and control groups on the Peabody Picture Vocabulary Test (Table 8). The scores show that the English-language learners gained more if they were in the intervention, whereas this was not the case for the English-only students. Neither difference was statistically significant, however.

Table 8 Gain Scores of Native and Non-Native Speakers in Intervention and Control Groups on the PPVT, Year 2		
Group	Intervention	Control
Native Speakers	7.33(N=63)	8.11(N=53)
Non-Native Speakers	9.88(N=40)	8.20(N=41)
Total	8.32 (N=103)	8.15 (N=94)

A subsequent analysis that took into account initial differences between students revealed that there was a significant effect on vocabulary development as a result of the intervention. In this analysis, we coupled students who had scored the same (within 2 points) on the Fall test and examined how they differed in the Spring testing. This is a matched subject statistical design that controls for initial differences between groups. The results are shown in Table 9 and reveal that there was a significantly greater gain among intervention students, especially among the English-language learners.

Table 9 Gain Scores of Native and Non-Native Speakers on the PPVT: Matched Participants, Year 2		
Group	Intervention	Control
Native Speakers	7.52 (N=31)	8.01(N=31)
Non-Native Speakers	7.07(N=14)	3.71(N=14)
Total	7.37 (N=45)	6.00 (N=45)

There were no differences between intervention and control groups on most of our other scores. For example, on the test of reading comprehension, the CLOZE test, the groups were almost identical (Table 10). This reinforced our belief that it takes more than a year to effect changes in vocabulary development with concomitant effects on reading. Previous research by Dutch authors indicated that it takes more than a year with an intervention of this nature to affect vocabulary gain in non-native speaking student. It was only after two years that this research (Appel & Vermeer, 1996) showed gain on the part of students in an intervention of a similar nature to our own.

Table 10 Gain Scores of Native and Non-Native Speakers in Intervention and Control Groups on the CLOZE Test, Year 2		
Group	Intervention	Control
Native Speakers	2.21(N=70)	2.28(N=58)
Non-Native Speakers	3.23(N=43)	3.30(N=43)
Total	2.81 (N=113)	2.78 (N=101)

Satisfaction with the Program

Classroom observations and interviews with the teachers revealed considerable disparity in the implementation of the intervention in different classrooms. Indeed, in several cases there were excellent teachers in the control classrooms who placed considerable emphasis on vocabulary development and spent more time in vocabulary exercised than did some of our intervention teachers.

We were quite pleased with the reaction of students and teachers to our program. The program was called the VIP program (for "Vocabulary Improvement Project") and students were quite pleased to be in the VIP program. Indeed, in some classes the VIP activities were the highlight of the day. Students were proud to be in the program and recognized the importance of vocabulary in learning. Some typical student comments:

> "I learned a lot of new words that I didn't know at the beginning of the year. I learned lots of strategies to figure out new words. I learned lots of words that have different meanings. I remember when I saw the word "jurisdiction" I didn't know what it meant. I thought that it was hard. But now it's so easy."
> "I learned new words that I didn't know before and that my parents didn't know either."
> "Now I know some word meanings that I never even knew existed! Good things happen, bad things happen....I think this was a good thing. I learned a lot."
> "I learned new ways to find out how to read a word or find out the meaning- sound it out; skip it and read the sentence and come back to it; look for >roots in the word."
> "Some of the activities got me worried but I got over it by thinking of all the activities that helped me learn it. Why didn't they come sooner?"
> " In my house I have the superb vocabulary. Vocabulary has helped me so much I used to be struggling in school but now I am an honor roll student."
> "I was impressed that I could be this smart but now thanks to VIP I am having fun in school and doing well. I have a lot more self-confidence than I ever had. My family respects me."

Teachers were somewhat concerned to be adding one more activity to their already full days. However, they found the lessons easy to implement and assimilated the strategies that we were focussing on. One teacher's comments were quite typical:

> "I learned a series of strategies to teach vocabulary in any content area. As students became familiar with the format (of the lessons), they could assimilate a lot of material in a very short period of time. I learned that through these techniques, students could absorb way more than I had thought and at a much more sophisticated level. I developed a much deeper understanding, and higher awareness, of the world of words."

Findings for Year Three

The third year brought a number of changes. The curriculum we used for the intervention had the theme of Immigration and consisted of a variety of materials--narratives, text book accounts, newspaper stories. The core target vocabulary was chosen as before--words that students would be in the process of learning and that were important across different disciplines. The full set of Intervention Materials for Year Three is found in **Appendix E**.

We had hoped that we would be able to continue students in our program for two years, but it proved difficult for principals at our schools to accommodate us in this respect. Student class assignments depend on a number of factors--availability of teachers, parent wishes, schedules of students--which were out of our control. Moreover, in California the passage of Proposition 227, which made bilingual education illegal, led to massive classroom reassignments. In one case, we were forced to change schools to obtain enough non-native speakers students for the intervention aspect of the study. As a result, there were only 63 student (34 English-language learners and 29 English-only students) who received the intervention for two years.

Data Analyses

The data for the core target vocabulary items (Spring test) indicated clearly that students who were in the intervention learned the material significantly better than did children in the control groups[2]. The students who where in the program for two years learned the core vocabulary somewhat better than those in the program a single year, but these differences were not significant.

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[2]This was the only case where there were significant initial differences between the groups. Because the control group was significantly lower in the Fall test on these materials, we carried out an analysis of covariance with the Fall scores as the covariate and the significant differences between groups remained.

Table 11 Mean Scores for Native and Non-Native Speakers in Intervention and Control Groups on the Curriculum-Dependent Material, Year 3			
Group	Intervention		Control
	One Year in Program	Two Years in Program	
Native Speakers	29.47 (45)	30.21 (29)	22.31 (N=36)
Non-Native Speakers	24.05 (55)	26.25 (32)	16.40 (N=42)
Total	26.49(100)	28.13 (61)	19.13(N=78)

Spring scores on the PPVT indicated that students in the intervention generally scored higher than students in the control groups--especially for English-language learners. However, these differences were not statistically significant. If we just consider students who were in the program for two years, the differences were even greater (Table 12). However, once again these differences did not attain statistical significance.

Table 12 Mean Scores for Native and Non-Native Speakers in Intervention and Control Groups on the PPVT Test, Year 3			
Group	Intervention		Control
	One Year in Program	Two Years in Program	
Native Speakers	119.87 (45)	123.24 (29)	123.68 (35)
Non-Native Speakers	94.28 (54)	95.00 (30)	85.84 (26)
Total	105.91 (99)	108.88 (59)	104.01 (76)

Data on reading comprehension based on the CLOZE test (Table 13) indicated that the intervention groups did better, especially among English-language learners. These differences were statistically significant, indicating a reliable effect of the intervention on reading comprehension. Among students who had been in the program for two full years, the differences were somewhat greater in favor of students in the intervention.

Table 13 Mean Scores for Native and Non-Native Speakers in Intervention and Control Groups on the CLOZE Test, Year 3			
Group	Intervention		Control
	One Year in Program	Two Years in Program	
Native Speakers	13.98 (44)	15.54 (28)	13.42 (N=36)
Non-Native Speakers	11.43 (53)	11.35 (32)	8.67 (N=42)
Total	12.59 (97)	13.30 (60)	10.86(N=86)

Similar results were obtained for our test of the ability to produce multiple meanings for words (Table 14). The data indicate that students in the intervention performed better than control students if they were in the program for two years. However, the differences were statistically significant for English-language learners and not for English-only students. That is, English-language learners who were in the program for two years were significantly better at producing multiple meanings than were English-language learners in the control group. Indeed, even English-language learners who were in the program for one year were significantly better at this task than was their comparison group.

Table 14 Mean Scores for Native and Non-Native Speakers in Intervention and Control Groups on the Polysemy Production Test, Year 3			
Group	Intervention		Control
	One Year in Program	Two Years in Program	
Native Speakers	11.93 (44)	14.00 (29)	12.83 (N=36)
Non-Native Speakers	10.00 (55)	11.19 (32)	8.00 (N=41)
Total	10.86 (99)	12.52 (61)	10.86(N=86)

On another measure of depth of word understanding--one that measured the student's knowledge of the semantic associations words have--the results indicated that students who received the intervention performed significantly better than comparable students who did not (Table 15). This was true especially for English-only students who were in the program for two years.

Table 15 Mean Scores for Native and Non-Native Speakers in Intervention and Control Groups on the Word Association Task, Year 3			
Group	Intervention		Control
	One Year in Program	Two Years in Program	
Native Speakers	44.40 (45)	48.86 (28)	44.44 (N=36)
Non-Native Speakers	40.29 (55)	40.81 (32)	34.88 (N=44)
Total	42.14(100)	44.57 (60)	39.18(N=80)

Did our intervention help to close the gap between EO children and ELLs? In Year 1 with fourth- and fifth-grade students, the gap between EO children and ELLs averaged 1.38 standard deviations on the vocabulary measures when all the measures were combined using standard scores. The gap on the reading comprehension test was .96 standard deviations. After one year of the intervention, the gap was 1.07 standard deviations between fourth-grade EO children and ELLs on the vocabulary measures and 1.06 standard deviations on reading comprehension. When we compared EO control students and ELLs in the intervention to determine the effect of the intervention in closing the gap, the differences remained about the same: 1.08 on the vocabulary measures and .97 on reading comprehension.

After the second year of the intervention, the gap was .87 standard deviations between fifth-grade EO children and ELLs on the vocabulary measures and .91 standard deviations on reading comprehension. When we compared EO control students and ELLs in the intervention to determine the effect of the treatment in closing the gap, the differences were attenuated: .55 standard deviations on the vocabulary measures and .50 deviations on reading comprehension. This compares to a difference of .98 standard deviations for vocabulary measures and 1.18 for reading comprehension when the ELLs in the control group are compared to EO controls.

Another way to answer this question is to compare the differences in gain scores between ELLs who were in the intervention and ELLs who were not with those of EO control students. That is, we wanted to see if ELLs who received the intervention gained more relative to EO control students than did ELLs who did not receive the intervention.

At the end of year one of the intervention, there were no differences in gain scores between ELLs who did not receive the intervention and EO controls. That is, EO students maintained their advantage over these ELLs. ELLs who did receive the intervention showed some greater gains than EO controls, but these differences did not attain statistical significance. Thus the gap between the groups remained after a year of the intervention.

At the end of the second year of the intervention, ELLs in the control group did not differ in their gains compared to EO control students. However, ELLs who received the intervention showed significantly larger gains than did EO controls on the test of knowledge of target words (t (121) = 7.91, p < .001; effect size .58), on the polysemy production task (t (119) = 3.37, p < .001; effect size .30), on the morphology task (t (121) = 2.02, p < .05; effect size .18), and on the test of cloze test (t (118) = 1.98, p = .05; effect size .18). The differences on the test of semantic associations also favored the ELLs in the intervention, though these differences were only marginally significant (t (120) = 1.81, p = .07; effect size .16). These findings provide further evidence that ELLs who received the intervention were closing the gap between themselves and EO students.

Case Study Findings

Two of our research questions remain unanswered:

Do English-language learners use the same strategies to infer vocabulary meaning as do native English speakers?
Do English-language learners use the same strategies in reading comprehension as native English speakers?

To answer these questions we relied on data from our case studies.

Case Study Analysis

The case study was based on data collected from 12 fifth-grade students from the Santa Cruz, California site. Because the VIP focuses on the vocabulary development of English Language Learners, 8 subjects were Spanish-English bilinguals. 4 monolingual students are included for comparative purposes. Half of the students were intervention students, half were control students. Gender was balanced, with 6 girls and 6 boys. Finally, half of the sample had high vocabulary ability, half had average vocabulary ability. These children were selected using TVIP/PPVT scores and teacher recommendations.

Target Strategy Passages

Students were presented with 18 short passages containing 18 words for which meaning must be resolved (see Table 16). These words were 5 cognates, 8 words for which meaning could be inferred through morphological analysis, 3 polysemous words used with a less common meaning, and 2 words in informative contexts. All words were tested in a pilot study and found to be words fifth grade children do not know. A variety of context clue types were used (contrast, synonyms, cause/effect). This task was designed to determine students' preferred strategies for assigning meaning to words, when presented with passages that invite the use of two or more strategies simultaneously or Spanish cognates in lean contexts.

Table 16 Stimuli Used in the Case Study Analyses	
A. Cognates –lean context	1. The new girl at the school seemed *amicable. 2. She began to feel *amorous towards him. 3. The students liked to *converse. 4. The *obscurity frightened us.
B. Cognates and context clues	5. Their lives now became regular, routine, and *tranquil, a welcome change after the many days of conflict during the campaign
C. Morphological and context clues	6. The boys were worried about the raft's *fragility. They therefore decided to reinforce it with the strongest, heaviest materials possible. 7. A professional basketball player came to speak to our class. He had grown up in our neighborhood. Even though he spoke in a *monotone, everyone was interested in what he had to say. 8. I was surprised to see my friend *shamelessly copy the test answers from my paper. 9. I have always been encouraged to set realistic goals for myself, not goals that are *unobtainable. 10. The country was overtaken by a cruel dictator. He and his government took away the rights of the people. The people felt humiliated and *dehumanized. 11. It was now time for his *hydrotherapy session, and so he was gently lowered into the pool. 12. Jose was having a difficult baseball season to begin with. Then, when he *refractured his wrist, he lost all hope of making the all-star team. 13.The first subway in New York was built in 1869, but did not actually go anywhere. A car that was pushed by a fan moved back and forth in a tunnel 100 yards long. People paid twenty-five cents for the *novelty of riding underground. For many people this was not an ordinary kind of ride.
D. Multiple meanings (target words) and context clues	14. After struggling for many months, the young company finally *landed a large government contract. The company can now pay its debts, and has even accumulated a large profit. 15. During the early 1930s, many small businesses *folded. Others were bought up by large corporations. 16. In order for a young country to succeed economically, it must have sources of ready

E.Context only	17. Unlike his brothers, who were noisy, outgoing, and very talkative, Fred was *taciturn. 18.Because the assignment demanded more courage than most men have, only the *intrepid among them were considered for the job.

Scoring

Tape recordings of each student's' think-aloud protocols were transcribed verbatim In initial coding, responses were coded as being accurate, partially accurate or inaccurate. Accurate responses include those for which the student provided a reasonable definition of the target word as it was used in the passage. It was decided to include the category "partially accurate" because it is recognized that vocabulary knowledge is not an all-or-nothing phenomenon but proceeds in increments.

Once the accuracy of the inferences was determined, the strategies students used in inferring meaning for each target word were coded as belonging to one of the four target strategies: **contexting, morphological analysis, cognate knowledge and knowledge of the multiple meanings of words**. Strategies other than the four target strategies were also inventoried. See Table 17 below for examples of accuracy and strategy coding.

Table 17. Examples of an accurate, partially accurate, and inaccurate inference of the meaning of target word *amorous* with accompanying strategy use
Passage: *She began to feel amorous towards him.*

Participant's Response	Description	Strategy
"I know what that means. Like him. Look. Amor. Love. Love towards him because I sort of went in the word and it sort of sounded exactly like love when I read it. "	Accurate	Cognate Knowledge
"I think it means that she began to feel more comfortable with him maybe ...because there's not really anything to say that it did but it's something to go 'toward' the man or boy, whatever, some kind of male person ..."	Partially accurate	Context
"Scared. I don't know...because probably it's somebody that she probably hates and she's afraid of him."	Inaccurate	No Clue

Amorous is defined by the Oxford American Dictionary as "adj. of, showing or readily feeling sexual love." The accurate response in Table 17 clearly expresses the core meaning of this word. The subject draws on her knowledge of the Spanish word amor in

inferencing the meaning of the word amorous; the strategy she uses is Cognate Knowledge. The partially accurate response captures an aspect of the meaning of amorous; "comfortable" is in the right direction, but does not convey the strength of romantic feeling in the word. The third response, "scared," suggests the opposite sort of feeling, and is thus coded as inaccurate. The subject who produced this response did not provide any additional information as to why he made this inference; it was therefore coded as No Clue.

Data Analysis

Table 18 presents a classification of the word inferencing strategies used by our subjects. Following Pritchard (1990), no quantitative minimum was required for the inclusion of a given strategy in the taxonomy because, as Johnston and Afflerbach (1985) explain,

> [a] classification system which requires a minimum number of instances of a specific strategy per subject or across subjects may be less sensitive to individual differences in strategy use. It will also be less sensitive to unique strategies and to strategies that are common across subjects but are infrequently used (p. 317) (Johnston and Afflerbach (1985), as quoted in Pritchard (1990).

The classification comprises 18 different strategies/strategy combinations. In most cases, subjects used a combination of strategies. Strategy combinations were grouped under one of the 4 strategies of interest: Cognate Knowledge, Morphological Analysis, Sensitivity to Multiple Meanings. In instances where two or more of these strategies were used simultaneously, the text-initiated strategy was considered primary. Strategies other than the 4 target strategies are included under the heading "Other."

Table 18
Classification of Word-Inferencing Strategies

A. Cognate Knowledge* 1. Cognate knowledge only 2. Cognate knowledge and context clues
B. Morphological Analysis 1. Morphological analysis only 2.Morphological analysis and context clues 3.Morphological analysis and background knowledge 4.Partial morphological analysis 5.Morphological analysis and false etymology

C. Context Clues 1. Context clues only 2.Context and syntactic clues 3.Context clues and morphology 4.Context clues and substitution 5.Context clues and false etymology
D. Sensitivity to Multiple Meanings 1. Sensitivity to multiple meanings only 2.Sensitivity to multiple meanings and context clues
E. Other 1.Previous knowledge 2.Background knowledge 3.False etymology 4.Substitution 5.Fill-in-the-blank

* used only by ELLs

Table 18 provides a useful comprehensive overview of the types of strategies used by our subjects. To answer the research questions, further analyses were conducted to identify the type and frequency of strategy use for accurate, partially accurate and inaccurate responses for each category of passage/target word (cognates in lean and informative contexts, and morphologically analyzable and polysemous target words in rich contexts) and for each group of children (ELLs, EOs, intervention/control). Of special interest were strategies that led to accurate inferences of unknown vocabulary words, and whether or not students employed the expected strategies. Accurate responses received a score of 2, partially accurate responses 1, and inaccurate responses 0. Means and standard deviations were computed for each group.

Results

In conducting this case study analysis we were interested in determining whether children use context clues, morphological analysis, knowledge of a word's multiple meanings when responding to short passages that provide limited or rich contextual information about a word. In the case of bilingual students, we were interested in determining whether they will use cognate relationships to assign meaning to unknown words.

Cognate Target Words

It was decided to collapse the categories "Cognates-lean context" and "Cognates-rich context" because in each case of an accurate inference in the latter category, context clues were used only to confirm an inference made using cognate knowledge. Combining, therefore, the category cognates and lean context with cognates

and rich context, we found that 20 of 60 (or 33%) of the total responses for this category were coded as accurate, and that cognate knowledge was used in 10 (50%) of these responses. Nine of the 10 accurate responses using cognate knowledge were produced by intervention ELLs, as compared to 1 in the control group. Cognate knowledge was also used in one of the 4 partially accurate inferences offered by ELLs, in this case a Spanish-speaking control student. Finally, none of the inaccurate responses involved the use of cognate knowledge.

These findings suggest that *(a) knowledge of cognate relationships is an effective strategy for inferring meaning for Latinate, infrequent, academic English words and (b) Spanish-speaking ELLs are more likely to use this knowledge if the strategy has been made explicit to them and demonstrated for them, as it was in the VIP vocabulary program.*

Morphologically Analyzable Target Words

We found that 36 of 96 (or 38%) of the total responses for this category were coded as accurate, and that morphological analysis was used in 34 (94%) of these responses. 34 of the 36 accurate responses used some form of morphological analysis. Twenty-four of the 36 accurate responses (66%) were produced by intervention children, and of these, 23 (96%) used morphological analysis to infer meaning for this group of target words. In the control group, 11 of the 12 correct responses (91%). Five of 13 (36%) partially accurate responses involved word part analysis.

Further, nine of the 13 (69%) partially accurate responses were from children in the control group. Finally, we found that nine intervention children made unsuccessful attempts at morphological analysis to resolve meaning for this category of word, as opposed to 3 in the control group. One striking finding was the number of unsuccessful inferences reached by using context clues only. Twenty-seven of 47 (57%) inaccurate responses involved the use of context clues exclusively, a strategy used primarily by control students: 20 of 27, or 74% of all students in this category.

These statistics suggest that *(a) accurate inferencing of the morphologically analyzable target words in rich contexts required some form of word part analysis (b) intervention children were more likely to engage in morphological analysis and thus arrive at a reasonable inference (accurate or partially accurate) for the target word, and (c) the use context clues alone are insufficient to make meaning of words in this category, and appears to be a default strategy when additional, appropriate tools are not brought to the task.*

Polysemous Target Words

Whereas the ability to identify cognate relationships and analyze parts of words clearly contributed to a student's ability to arrive at a reasonable inference of target words that lent themselves to those strategies, sensitivity to the polysemous nature of the target

words *landed, folded* and *capital* was not consistently associated with the accuracy of inferences. Rather, this awareness often served a different strategic function-that of rejecting a more familiar meaning of the target word and returning to the context for clues to a second possible meaning. Less than half of the children who successfully or partially successfully inferred meaning for the words in this category referred to the polysemous nature of the word, presumably because they were as familiar with the secondary meanings used in passages as with more common meanings. In fact, a look at the strategy pattern for inaccurate responses may be more telling of the role of sensitivity to the multiple meanings of words. We found that 9 of the 15 inaccurate responses (60%) contained references to the multiple meanings of the target words. There were no differences between intervention and control students on this task.

To summarize, although there were no differences in inferencing the meaning of polysemous words, the case study analyses of selected students indicated that students who had been in the intervention used the strategies they were taught more often and more successfully than control subjects. An additional analysis indicated that the students in the intervention were more successful (55% of the time) than control subjects (32%) in correctly inferring meaning for unknown vocabulary words.

Implications for Educational Practice

In the first year of this program, we found a large gap of about a standard deviation between scores on vocabulary measures and reading comprehension between native EO children and ELLs. An examination of the intercorrelations between variables indicated that ELLs are relying more on their vocabulary knowledge than are EO students when reading text. Presumably natives speakers are more dependent on background knowledge and other inferential skills at this point in their reading. This finding underscores the importance of vocabulary knowledge for children who are not native speakers of English.

The set of lessons we developed used a variety of strategies to make children aware of vocabulary and to help them infer meanings of words they are not familiar with. The findings from the intervention indicated that the children receiving the intervention learned the target vocabulary items better than did control children. However, there were no other gains for children in the intervention after one year. Moreover, the scores of ELLs in vocabulary knowledge and reading comprehension remained about a standard deviation lower than those of EO children.

However, this changed after the second year of the intervention (Year 3 of the study). The effects of the intervention were more marked after this year. This was true for both the EO children and ELLs, when compared to similar control students. Most of the vocabulary measures and the reading comprehension measure indicated improvement as a result of the intervention. Furthermore, the intervention had the effect of closing the gap between EO students and ELLs by about half a standard deviations for both vocabulary and reading comprehension measures.

These findings are consistent with the work of the Dutch researchers Appel and Vermeer (1996) who employed a similar intervention of two to four hours of Dutch vocabulary instruction within and outside of the classroom with non-native Dutch children. After four years in the program, children showed gains of one or two years in vocabulary development when compared to their age peers of the same ethnic background. There were also marked gains in reading comprehension. These researchers concluded that ethnic minority children can catch up to native speakers in vocabulary knowledge if they receive targeted vocabulary instruction for about four hours a week throughout the school year and if the instruction is carried out for all eight grades of primary school.

Our research also suggests that a year of intervention is not enough. Generally speaking, our data indicate that those children who were in the program for two years outperformed children in the program for only a year--although there was only a trend in this direction on the vocabulary measures for ELLs and no differences were found on the reading comprehension measure.

There is also the possibility that the advantage found in the second year of the intervention accrued from the changes we made between the first and second years. At this point we had added new activities and removed some that were not well understood by teachers and students. We had more literary genres and the activities were more enjoyable to the students. Moreover, there were new teachers in the second year of the intervention, and they might have been more involved with the materials.

Whatever the reason, the results after two years were more positive than those we found after one year. Our findings suggest that gains can be made by non-native speakers in vocabulary development and reading comprehension over time if they receive an enriched program of vocabulary instruction. Ideally, such a program would be in place throughout the years of primary schooling.

Finally, it should be noted that we achieved these results in spite of considerable variability in fidelity of implementation. There was variability in teacher motivation and engagement, in time devoted to the lessons, in student absences. School-wide testing often made investing enough time in these lessons difficult. Nonetheless, in spite of differences in implementation, a set of activities that focused on vocabulary enrichment led to improvements in vocabulary knowledge and reading comprehension, especially for English-language learners.

In conclusion, our findings suggest that gains can be made by non-native speakers in vocabulary development and reading comprehension over time if they receive an enriched program of vocabulary instruction. On the basis of our research, we have developed a three-year program of vocabulary enhancement that is currently being reviewed by a major school publisher (see **Appendix F**). In addition, we have developed a brochure for parents that stresses the importance of vocabulary and suggests ways they can enhance their child's vocabulary development (see **Appendix G**).

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